

REMARKS

Initially, applicants and the undersigned thank the Examiner for the courtesies he extended during the telephone interview with the undersigned and inventor Guleryuz on May 13, 2004.

Claims 1, 2, 4-10, 12-18, 20-24 and 33-35 are pending. Each of the independent claims (1, 9 and 17) has been amended to refocus the invention. The feature of the parameterizing and smoothing instructions being pre-computed, stored in a look-up table, indexed by the corresponding identifier, and directly accessed during the parameterizing and smoothing has been removed from each of the independent claims, as this feature is not needed to establish patentability of those claims. This feature is now contained in each of dependent claims 2, 10 and 18. As a result, the tracing feature that was recited in each of those dependent claims has been deleted therefrom and is now embodied in each of new dependent claims 33-35. The dependencies of claims 4, 5, 12, 13, 20 and 21 have been changed accordingly. Regarding further amendments to the independent claims, the limitation of "chain-code" has also been removed from each; the original and broader term "identifier" has been reinstated. This change has been propagated through the dependent claims as well.

As was also discussed during the interview, each independent claim has been further amended to indicate that the parameterizing and smoothing operations are done without consideration of non-boundary segment data, and that the new boundary segment generated as a result of these operations is rendered to increase the resolution of the object of which the segment is a part.

Each of the presently pending independent claims (1, 9 and 17), as well as dependent claims 8, 16 and 24, have been rejected under 35 U.S.C. § 103(a) based on U.S. patent 5,537,495 to *Overton* in view of U.S. patent 4,777,651 to *McCann et al.* (*McCann*). The Examiner contends that *Overton* generally discloses a pixel correction and smoothing method to improve the resolution of a digital representation. *McCann* is cited as teaching the details recited in claims 1, 9 and 17. Applicants respectfully traverse this rejection.

The shortcomings of *Overton* as applied to applicants' claimed invention was discussed in some detail in applicants' previously-filed Amendment A. In short, *Overton's* method of improving the rendering of a pixel pattern, does not involve identifying text or graphics boundary pixels. More importantly, he neither discloses nor teaches the tracing, identifier constructing and parameterizing aspects of applicants' invention, as set forth in claims 1, 9 and 17.

McCann does not overcome the deficiencies of *Overton*. First, *McCann's* process of converting a bit-map image of a picture to vectors during scanning is significantly different from *Overton's* pixel smoothing and correction method, in which small blocks of a bit mapped pattern (input tiles) each serve as addresses to a look-up table containing corrected pixel pattern portions (output tiles) corresponding to target pixels to be corrected in the respective input tiles.

In addition to the technological differences between *Overton* and *McCann*, *McCann's* process is also quite different from applicants' claimed invention. In the course of *McCann's* conversion process, the bit-map image is manipulated to form a series of windows, each containing a set number of pixels. The windows of pixels are serially examined, and based on the pattern of light and dark pixels within the window, the center pixel is changed from dark to light, from light to dark, or left unchanged. A corresponding number associated with a given window pixel pattern identifies it as one of the possible patterns and provides a table-look up instruction to determine what change, if any, to make to the center pixel. This operation applied to windows centered at each pixel, performs all image transformation of growing, smoothing, thinning and noise elimination of the bit-map image.

The line and edge features of the resulting bit-map representation are partitioned into line segments, each of which is chain-coded and temporarily stored, as it is acquired, in an ordered list. When storage of each chain-coded segment is completed, the segment is converted to vectors and transmitted to a user device for display, storage or further processing. The process continues until the entire document has been scanned and converted to vector data.

A careful comparison between *McCann's* process and applicants' invention reveal that they are quite different. To begin with, *McCann's* input-to-output conversion is a lossy compression process which means that information is lost. This is an intended consequence of *McCann's* process (which includes removal of spurious points) and one that is directly at odds with applicants' invention which involves resolution, and hence quality, enhancement. Applicants' invention does not compress; rather, it increases the resolution. In applicants' invention, information is not lost; in fact, information is gained. This point is further emphasized in each of the independent claims by reciting that the rendering of the parameterized and smoothed boundary segment is done to increase the resolution of the text or graphics object.

With the above difference in mind, it is also clear that *McCann's* "smoothing" operation to remove spurious points is completely different from applicants' claimed local boundary segment smoothing. No points are considered "spurious" in the context of applicants' invention. In fact, applicants' invention would process such points and make them look better, not remove them. *McCann's* smoothing is part of a more general operation that also includes growing and thinning which is carried out for accurate edge detection. Applicants' invention does not involve edge detection; the locations of the edges are known.

Moreover, *McCann* does not compute parameterizing and smoothing instructions nor does he apply such instructions to a local boundary segment to parameterize and smooth the segment resulting in a new segment. He generates vector data using a chain-code. But before his chain codes are generated, that is, when he is processing the window data, each window is assigned a number that is used to access an instruction in a look-up table to determine whether or not to change the color of the center pixel. That instruction is simply whether to change the color of the center pixel of the given window. The instruction is not for increasing resolution, as each of applicants' independent claims recite.

Neither of the other applied references—U.S. patent 5,448,692 to *Ohta* and U.S. patent 4,528,693 to *Pearson et al.*—overcomes the deficiencies of the *Overton/McCann* combination.

In view of the foregoing, it is believed that all pending claims are patentably distinguishable over the art of record. Should the Examiner believe that issues remain outstanding, he is respectfully requested to contact applicants' undersigned attorney in an effort to resolve such issues and advance the case to issue.

Respectfully Submitted,

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